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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,069	06/27/2003	K. Scott Weil	12903-B	7459

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Douglas E. McKinley, Jr.
McKinley Law Office
P.O. Box 202
Richland, WA 99352

EXAMINER

ECHELMAYER, ALIX ELIZABETH

ART UNIT	PAPER NUMBER
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1795

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05/13/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/609,069	Applicant(s) WEIL ET AL.	
	Examiner Alix Elizabeth Echelmeyer	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 1, 2010 has been entered.
2. Claims 1 and 13 are amended. Claims 1-21 are pending and are rejected for the reasons given below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 8-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. (US 2003/0235746) in view of Pondo (US 6,017,649) and Thomas et al. (2005/0074659).

Haltiner et al. teach a solid oxide fuel cell (SOFC) having sheet metal parts stamped from flat stock (abstract, [0009], [0010]). The parts, including a mounting frame for a positive electrode – electrolyte – negative electrode (PEN) and a separator plate, are used to form modules, or cells (abstract, [0009]). Those modules can then be

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stacked to form a fuel cell stack (Fig. 7, [0032]). Haltiner et al. also teach the use of current collectors which may be connected across a load (Fig. 3, [0003], [0025]). Glass seals are used between the modules. A glass layer or ceramic adhesive is applied prior to assembly, then the stack is "subjected to high pressure and temperature, whereby the glass seals are liquefied and fused" ([0032]). Since this is the same as the claimed method, the examiner finds that the seals are inherently hermetic as required by claim 1.

Regarding claim 1, the SOFC modules of Haltiner et al. contain a stamped separator plate, a stamped frame, a PEN attached to the frame, and the frame attached to the separator plate. Regarding claims 3 and 17, the SOFC of Haltiner et al. contains current collectors that are in communication with the separator plate. Applicants' claim 8 is for a method of making a SOFC stack, and claim 13 is a SOFC stack. Haltiner et al. teach the combination of several modules to form a stack as well as the sealing of the modules.

Applicants' claims 9-12, 14, and 15 are drawn to the method of sealing a SOFC stack and the seal on the SOFC stack. Haltiner et al. teach insulating seals made of glass or a ceramic. The seal is formed by exposure to high temperature and pressure. Further, Haltiner et al. teach the connection of separator plates and frames by brazing..

With further regard to claims 1 and 13, Haltiner et al. fails to teach the stamped separator plate and frame with displaced outer edges. Instead, Haltiner et al. teach a composite, with the cathode spacer and separator being analogous to the stamped

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separator plate, and the anode spacer analogous to the frame, but lacking the downwardly displaced outer edge (see Figure 4 of Haltiner et al.).

Pondo teaches multiple step manifolds for the fuel and oxidant streams (column 2 line 66 - column 3 line 9). A fuel cell assembly is seen in Figure 3B of Pondo. Pondo teaches that the upward and downward bends of the plates make for a better seal in the manifolds as well as better integrity of the plates, and the resultant fuel cell can tolerate greater stack pressures (column 3 lines 1-6). Pondo further teaches that the bent pieces may be made by stamping sheet metal (column 6 lines 51-57).

It would be advantageous to make the separator plate of Haltiner et al., with the cathode spacer, into one piece such as seen in the separator plate of Haltiner et al. (as seen in Figure 3B, for example), with an upward bend at the manifold, since such a configuration would make a better seal and increase the strength and integrity of the fuel cell. Further, such a bent configuration would be advantageous to use with the anode spacer of Haltiner et al., such as seen in the bottom separator of Pondo (Figure 3B), since it would provide a better seal since it would meet with the bent part of the separator in the cell below, through which the fuel would have to pass.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the cathode spacer and separator of Haltiner et al. into a single piece that is bent upwardly, such as in Pondo, and to make the anode spacer, or frame, into a piece that is bent downwardly so as to form a seal with the adjacent separator of the cell below.

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As for the limitation in claims 1 and 13 requiring a support bump in the frame or separator plate, Haltiner et al. in view of Pondo fail to teach a support bump.

Thomas et al. teach gas flow control formations, or support bumps, that serve as spacers to control the spacing of the separator plate in the fuel cell ([0021]).

It would be desirable to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

5. Claims 2 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view of Pondo as applied to claims 1 and 13, above and in further view of Carolan et al. (US Patent Number 5,750,279).

The teachings of Haltiner et al. and Pondo as discussed above are incorporated herein.

Haltiner et al. in view of Pondo teach a fuel cell stack and the method of making it wherein the stack is made up of modules. The modules are formed by frames containing a PEN, which are connected to separator plates. Haltiner et al. fails to teach the use of 400 series stainless steel as the material for the frames and separators.

Carolan et al. teach that stainless steel (400 series) is suitable for use in SOFC's because it is resistant to corrosion and oxidation.

It would be favorable to use 400 series stainless steel as taught by Carolan et al. in the SOFC of Haltiner et al. in view of Pondo because 400 series stainless steel can be stamped as required in Haltiner et al. in view of Pondo, and it is also resistant to corrosion and oxidation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the 400 series stainless steel of Carolan et al. in the SOFC of Haltiner et al. and Pondo because 400 series stainless steel is resistant to corrosion and oxidation.

6. Claims 4-7 and 18-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view of Pondo as applied to claims 3 and 17 above, and in further view of James et al. (US Patent Number 5,766,789 A).

The teachings of Haltiner et al. and Pondo discussed above are incorporated herein.

Haltiner et al. in view of Pondo teach the use of an electrically conducting interconnect. Haltiner et al. in view of Pondo fail to teach the use of a flexible material such as a screen for those interconnects.

James et al. teach the use of a screen as a flexible material for an interconnect (column 3 lines 24-26). James et al further teach a compound containing mostly (76%) nickel for the formation of the screen used as the current collector in the anode.

By forming the current collector of Haltiner et al. in view of Pondo with the screen of James et al., a current collector made from a flexible, electrically conductive material is made.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to make the current collector of Haltiner et al. in view of Pondo with the screen of James et al. in order to make a flexible, electrically conductive current collector.

Response to Arguments

7. Applicant's arguments filed November 9, 2009 have been fully considered but they are not persuasive.

Applicant argues, beginning on the bottom of page 6, that Pondo fails to teach PEN cells. The examiner strongly disagrees. Pondo clearly teaches the conventionally known "positive-electrolyte-negative" configuration found in the claims and Haltiner et al. Applicant is directed to column 3 lines 10-25, where Pondo clearly describes using PEN cells.

The examiner disagrees with Applicant's interpretation of the carbonate and matrix materials of Pondo. The examiner is unclear as to what Applicant believes these materials to be, but the examiner finds that Pondo teaches the matrix to be a sealing material (column 3 line 66 - column 4 line 3). Applicant is reminded that the instant invention also uses sealing materials.

On page 7, Applicant also argues that the displacement of the plates of Pondo is not on the outer edge. Again, the examiner disagrees. It is clearly seen in Figures 2A and 2B the displacement on the outer edge of the separator, corresponding to line II-II in Figure 1.

Also on page 7, Applicant argues that Pondo does not teach that the separator plates do not form the manifold. Again, the examiner disagrees. In Figure 1, it is seen that the manifolds (13) are formed in the separator plate (10). Furthermore, the claims do not require limitations to the manifolds being formed *in* the separator plate; instead the claims require that the *attaching* of the frame to the separator plate forms a manifold.

The examiner holds that the teachings of Haltiner et al. in view of Pondo render the claimed invention obvious, since it is simply the shape of the separator plate of Pondo that is relied upon in the rejection, as is discussed in the above rejection.

As to Applicant's arguments regarding Carolan et al., the examiner is not convinced. It appears that Applicant is suggesting that the skilled artisan would not be capable of knowing to stamp a stainless steel separator plate without the teachings of

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the instant disclosure. This is untrue: the examiner finds that it is will within the ordinary level of skill in the art to stamp a stainless steel separator plate. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

As to Applicant's arguments concerning James et al., the examiner finds that the limitations that Applicant alleges are not taught in the combination are, in fact, taught, as is discussed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795

Alix Elizabeth Echelmeyer
Examiner
Art Unit 1795

aee